

- 16 -

**CLAIMS**

1. A water treatment system (100) comprising:

a. a well pump arrangement (102) for drawing contaminated, more specifically saline, water from a well;

5       the well pump arrangement comprising at least one double-cone device, the double-cone device having an inlet where matter is sucked in during operation;

b. a purification unit (104) for separating the contaminated water into purified water and brine  
10       solution, the purification unit further comprising:

i. an intermediate reservoir (110) for storing the contaminated water;

15       ii. a pumping arrangement (112) to pressurize the contaminated water obtained from the intermediate reservoir; and

iii. a separating unit (114) to separate the pressurized contaminated water into purified water and brine solution;

c. a brine line (106) for carrying the brine solution from  
20       the separating unit to the well pump arrangement;

so that brine solution is capable to pour out of the inlet of the double-cone device and to sink down in the well and disposal of brine solution and into the environment is avoided.

- 17 -

2. The system according to claim 1, wherein the well pump arrangement for drawing saline water from a well comprises:

5       a. a first double-cone device (302A) to convert a low flow rate high pressure brine feed into a lower pressure higher volume feed using the available well water; and

10      b. at least one second double-cone device (302B) to utilise the enhanced feed so as to draw even more water from the well onto the ground level;

15      whereby the well pump arrangement increases the volume of water that can be drawn from a well.

3. The system according to claim 1, wherein the pumping arrangement to pressurize the contaminated water is a closed loop comprising:

15      a. a double-cone device (116) for pressurizing the contaminated water obtained from the intermediate reservoir (110) and

20      b. a circulating pump (122) connected to the inlet of the double-cone device to improve the flow of the contaminated water in the closed loop.

25      4. The system according to claim 1, further comprising a second separation unit (204) that utilises the pressure of the brine to dilute water from the intermediate reservoir (110), yielding a lower concentration contaminated water and a more concentrated brine solution,

- 18 -

wherein the more concentrated brine solution is used as feed for the well pump arrangement, and

wherein the lower concentration contaminated water flows to the closed loop pumping arrangement.

- 5 5. The system according to claim 1, further comprising a circulating pump (121) to increase the flow of saline water from the intermediate reservoir to pumping arrangement (112).
- 10 6. The system according to claim 1, further comprising a circulating pump (120) to boost the pressure from the outlet of the pumping arrangement to the separation unit (114).
- 15 7. The system according to claim 1, further comprising one or more pressure regulating valves (124) attached to intermediate reservoir (110), so as to supplement the feed pressure to the high pressure pump system.
8. A method for integrating a purification unit (104) and a well pump arrangement (102; 302) to obtain sweet water, the method comprising the steps of:
  - 20 a. drawing contaminated water from a well (103) using the well pump arrangement;
  - b. passing the contaminated, more specifically saline, water through the desalination unit to obtain sweet water and brine;
  - 25 c. utilising the brine as a feed to run the well pump

- 19 -

arrangement; and

- d. stopping the brine flow through the well pump when the concentration of the contamination in the brine, more specifically the salt concentration, exceeds a predetermined limit, so that brine exits the well pump into the well in order to avoid disposal of brine solution into the environment.
- 5
9. The method according to claim 8, wherein the step of utilising the brine as the feed to run the well pump (102; 302) arrangement further comprises the step of diluting the brine solution with well water in order to slow down the build up of the salt concentration.
- 10
10. The method according to claim 8, wherein the step of drawing contaminated water from the well (103) using the well pump arrangement (102;302) further comprises the step of converting a low volume contaminated water flow into a higher volume contaminated water flow by admixing water (105) of the well.
- 15
11. The method of claim 10, wherein at least one double-cone-unit (102; 302A, 302B) is deployed in the well pump, the double-cone unit being driven by the contaminated water as the working fluid and sucking in well water (103).
- 20

-----